

Strays – Geomagnetic indices

One of the best-known hallmarks of amateur radio is the activity of directly contacting another station around the globe. It's not only fun but demonstrates the value of radio in the event of a large-scale incident that requires reaching outside your state or country. Unfortunately, several natural phenomena can disrupt that communication, and one of them is unsettled or large geomagnetic activity.

In the interest of predicting adverse geomagnetic conditions, NOAA (National Oceanic and Atmospheric Administration) and IAGA (International Association of Geomagnetism and Aeronomy) have devised several measurably quantifiable indicators to warn systems that are potentially affected by geomagnetic disturbances. Each is known as an index, and collectively we refer to them as [geomagnetic indices](#) (indexes).

Earth's magnetic field is affected by regular solar radiation changes, often due to the interaction between the solar wind and the magnetosphere, and by interactions between the magnetosphere and the ionosphere. The most popular geomagnetic indices that seem interesting to amateur radio operators are the A-index and the K-index, which reflect these interactions.



Band conditions banner showing A_p and K_p

The A-index is the average **long-term (24-hour) stability** of Earth's magnetic field relative to a predetermined "quiet" value. We often refer to the A_p -index, in which the "P" means *planetary*, or averaged from several key measurement points across planet Earth. It values from 0 to 400, and values over 100 general-



ly indicate an unfavorable condition for amateur radio propagation.

The A_p -index is measured relative to the current geomagnetic storm, and provides the maximum effect of the storm during the past 24 hours. Considered over the span of many years, the A_p -index provides a *maximum disturbance measure* of geomagnetic activity over time.

The K-index is similar to the A-index, but is the daily average **short-term (3-hour) stability** of Earth's magnetic field compared with what is regarded as "quiet" activity. Just like with the A_p -index, we often refer to the K_p -index for the *planetary averaged value*, from 0 to 9.

Relevance

Ok, so, what does all this techno-babble mean to you, the average amateur? Bottom line is, **the higher these numbers, the worse the band conditions due to elevated levels of geomagnetic disturbance**. If A_p is over 100 or K_p is over 5, HF [SSB](#) propagation might not be your friend, and you might have better luck with either FT8 or local repeaters.

Geomagnetic storms, measured by the indices, disrupt radio propagation by significantly altering the density and structure of the ionosphere. This leads to unpredictable signal variations, absorption of frequencies that are normally not absorbed, and irregular propagation paths. According to [SpaceWeather.com](#), March has the most geomagnetically active days during the year, with October running a close second place, and it's no coincidence that these maxima are near the equinoxes.

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